language already appearing in each of claims 1 and 2. Specifically, from Merriam-Webster's Collegiate Dictionary, 10th Edition, the word "constant" has the following accepted meanings: exhibiting constancy of mind or attachment; invariable, uniform; and continually occurring or recurring. Likewise "fixed" includes the following meanings: securely placed or fastened, stationary; not subject to change or fluctuation; and immobile. Given the high degree of similarity between the definitions of "constant" and "fixed", that the substrate stage is now to be "fixedly provided" on the vacuum vessel plate is clearly within the scope and meaning of the claim language previously presented. Accordingly, the amended language of claims 1 and 2 cannot be considered to be a new issue. In fact, the Examiner, in stating at page 4 of the Final Office Action that

> "the apparatus of Watanabe et al is capable of having the substrate stage at a substantially constant vertical position for a given amount of time",

it is clear that the Examiner also had to have given consideration to the claim language "substantially constant vertical position" as at least implying a degree of permanence in the stage location. Accordingly, for all the foregoing reasons, Applicants submit that no new matter has been introduced into claims 1 and 2, as amended, nor are there any new issues raised therein.

The Examiner is thanked for the courtesies extended in the telephone interview of Monday May 12, 2003, in which the rejection of claims 1 and 2 based upon Watanabe et al '420 in view of Takahashi '574 was discussed. In an offer to avoid the possibility of a broad interpretation of the "constant" language in claims 1 and 2, an offer was made to amend claims 1 and 2 to further recite that the stage is "fixedly provided" on the vacuum vessel plate and to state that the stage thereby has a constant vertical position relative to the vacuum vessel plate. The initial reaction of the Examiner to such amended language was positive. The Examiner did however argue that such amendment language would raise new issues. Applicants countered that argument by stating that the claim amendments were within the scope of the "constant" position language already in the claims. The Examiner did not agree with this assessment.

Responsive to the rejection of claims 1-4 and 6-10 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,580,420 (Watanabe et al) in view of U.S. Patent No. 5,314,574 (Takahashi), Applicants have amended claims 1 and 2 and submit that claims 1-4 and 6-10 are now in condition for allowance.

Claim 1, as amended, recites in part:

> "a substrate stage fixedly provided on said vacuum vessel plate, said substrate stage thereby having a constant vertical position relative to said vacuum vessel plate..."

Applicants submit that such an invention is neither taught, disclosed, nor suggested by any of the cited references, alone or in combination.

Watanabe et al provides wafer lifting mechanisms 14A and 14B within the load lock chambers 4, 5, and the processing and post-processing chambers 6, 7. Watanabe et al further discloses a drive mechanism 69 for vertically moving a specimen stage 68. In the apparatus of Watanabe et al, the magnetic field formed by celluloid coils 65 can be controlled in a wide range. Since the setting of the height of the specimen stage 68 as an electrode can be recipe-based, for example, to make the current density of ions incident on a specimen controllable by regulating the height of the specimen stage, the ion current density can be changed as needed. Consequently, an optimum plasma processing becomes feasible since specimen stage 68 can be vertically positioned. Given that there is a specific advantage to be gained in Watanabe et al by selectively vertically moving specimen stage 68, modifying the specimen stage so as to be fixed in its position so as to have a constant vertical position would, in fact, render Watanabe et al unsatisfactory for an intended purpose thereof (MPEP § 2143.01). Therefore, Watanabe et al fails to teach or suggest the invention as set forth in claim 1, as amended.

Watanabe et al '420 has various potential shortcomings that are associated with the use of wafer lifting mechanisms 14A, 14B.

Such problems are avoided in the present invention by using a fixedly provided substrate stage. The wafer lifting mechanisms 14A, 14B of Watanabe et al could contribute to poor maintainability because of the degree of congestion on the lower face of the apparatus. Additionally, the configuration of Watanabe et al presents another possible problem of shortening the lifetime of the wafer stage and so forth because of the lifting/lowering of the wafer temperature control mechanism, wafer electrostatic control mechanism, high frequency impression mechanism, wafer lifting mechanism, and the like together with the lifting/lowering of the wafer stage.

Takahashi discloses that the loading platform 18 is arranged atop intermediate cover 19. A raising and lowering mechanism, for example an inner cylinder 24, is provided for raising and lowering intermediate cover 19. As seen from Figs. 1 and 6, both loading platform 18 and intermediate cover 19 are together raised and lowered by actuation of air cylinder 24, thereby also raising and lowering semiconductor wafer W. Therefore, Takahashi fails to teach or disclose the invention as set forth in claim 1, as amended.

On the other hand, the present invention has various advantages associated therewith. The wafer stage is fixed in the process chamber such that a gate valve is not required for assuring the axial symmetry with respect to the wafer arrangement

in the process chamber. As the gate valve is not used, the floor occupation space of the cluster tool will be about 1/3 of the conventional cluster tool. Further, as the mechanism for moving the wafer stage up and down is not required, a wide space under the lower face of the apparatus can be obtained. Therefore, the present invention results in excellent maintainability. It is noted that each of the cited references does not disclose or suggest any such advantage.

For all the foregoing reasons, Applicants submit that claims 1-4 and 6-10 are in condition for allowance and respectfully request that the rejection of claims 1-4 and 6-10 under 35 U.S.C. §103(a) be withdrawn.

In a similar manner, claim 2 recites in part:

> a plurality of substrate stages fixedly provided on said vacuum vessel bottom plate, each of said substrate stages having a constant vertical position relative to said vacuum vessel bottom plate...

Applicants submit that claim 2, which sets forth subject matter substantially similar to that set forth with respect to claim 1 above, is thus also in condition for allowance for reasons similar to those given for claim 1, above.

Claims 5 and 11 are rejected under 35 U.S.C. §103(a) as being unpatentable over Takahashi, as applied to claims 1-4 and 6-10 above, and further in view of JP10-177994 (Nasahiro et al). However, claims 5 and 11 each depend from claims 1, which is in

condition for allowance for the reasons set forth above. Thus, Applicants submit that claims 5 and 11 are also in condition for allowance and hereby respectfully request that the rejection thereof under 35 U.S.C. §103(a) be withdrawn.

If the Examiner has any questions or comments that would speed prosecution of this case, the Examiner is invited to call the undersigned at 260/485-6001.

Respectfully submitted,

Randall J. Knuth
Registration No. 34,644

RJK/mdc10

Encs: Marked-up Claims
Return Postcard

RANDALL J. KNUTH, P.C.
3510-A Stellhorn Road
Fort Wayne, IN 46815-4631
Telephone: 260/485-6001
Facsimile: 260/486-2794

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450, on: June 2, 2003 .

Randall J. Knuth, Registration No. 34,644
Name of Registered Representative

Signature

June 2, 2003
Date

MARKED-UP CLAIMS

1 (currently amended): A semiconductor manufacturing apparatus for processing a substrate surface, said apparatus comprising:

a vacuum vessel having a vacuum vessel plate;

a substrate stage fixedly provided on said vacuum vessel plate, said substrate stage thereby having a ~~substantially~~ constant vertical position relative to said vacuum vessel plate;

a cylinder installed surrounding said substrate stage, a gap existing between said cylinder and said vacuum vessel plate, said gap being made variable by lifting/lowering said cylinder, said cylinder having a cylinder interior space and a cylinder exterior space associated therewith, said cylinder interior space defining a processing chamber for processing said substrate surface, said cylinder exterior space including a transport chamber for transferring said substrate;

at least one cylinder lifting/lowering mechanism being operatively associated with said cylinder;

a substrate conveyer mechanism provided with said transport chamber, said substrate conveyer mechanism for transferring said substrate between said processing chamber and said transport chamber through said gap;

said processing chamber being provided with a processing chamber gas inlet and a processing chamber gas outlet; and

MARKED-UP CLAIMS

said transport chamber being provided with a transport chamber gas inlet and a transport chamber gas outlet.

2 (currently amended): A semiconductor manufacturing apparatus for processing a substrate surface, the apparatus composed of a vacuum vessel with a top and bottom plate, said apparatus comprising:

a plurality of substrate stages fixedly provided on said vacuum vessel bottom plate, each of said substrate stages thereby having a ~~substantially~~ constant vertical position relative to said vacuum vessel plate;

a plurality of cylinders provided respectively with an O ring connected to said bottom plate through bellows so as to surround said substrate stage, said cylinders forming a gap with said vacuum vessel top plate, a gap between said cylinder and said vacuum vessel top plate being made variable by lifting/lowering said cylinder, and at a position where said gap becomes minimum, a plurality of cylinder lifting/lowering mechanisms operatively associated with said cylinder being provided, in order to hermetically separate an interior space inside said cylinder from an exterior space outside thereof, said interior space forming a processing chamber for processing said substrate surface, the exterior space defining a transport chamber for transferring said substrate;

MARKED-UP CLAIMS

said transport chamber being provided with a substrate conveyer mechanism for transferring said substrate between said processing chamber and said transport chamber through said gap;

said processing chamber being provided with a processing chamber gas inlet and a processing chamber gas outlet; and

said transport chamber being provided with a transport chamber gas inlet and a transport chamber gas outlet.

3 (previously amended): The semiconductor manufacturing apparatus according to Claim 1, wherein said vacuum vessel can be divided into a part including said processing chamber and a part having said substrate transport mechanism.

4 (previously amended): The semiconductor manufacturing apparatus according to Claim 1, further comprising a plasma generation mechanism for generating plasma in said processing chamber.

5 (previously amended): The semiconductor manufacturing apparatus according to Claim 4, wherein said plasma generation mechanism radiates microwave energy through a slot antenna.

6 (original): The semiconductor manufacturing apparatus according to Claim 4, wherein a plurality of cylindrical permanent magnets are disposed substantially on the circumference surrounding the substrate in the atmosphere outside said vacuum vessel, in order to impress magnetic field around said substrate.

MARKED-UP CLAIMS

7 (~~original~~): The semiconductor manufacturing apparatus according to any one of Claims ~~1 to 6~~ 2, wherein said substrate stage is provided with a means for impressing direct current or alternating current power.

8 (previously amended): The semiconductor manufacturing apparatus according to Claim 2, wherein said vacuum vessel can be divided into a part including said processing chamber and a part having said substrate transport mechanism.

9 (previously amended): The semiconductor manufacturing apparatus according to Claim 2 comprising a plasma generation mechanism for generating plasma in said processing chamber.

10 (previously amended): The semiconductor manufacturing apparatus according to Claim 3 comprising a plasma generation mechanism for generating plasma in said processing chamber. 11. The semiconductor manufacturing apparatus according to Claim 10, wherein said plasma generation mechanism radiates microwave energy through a slot antenna.

11 (previously amended): The semiconductor manufacturing apparatus according to Claim 10, wherein said plasma generation mechanism radiates microwave energy through a slot antenna.